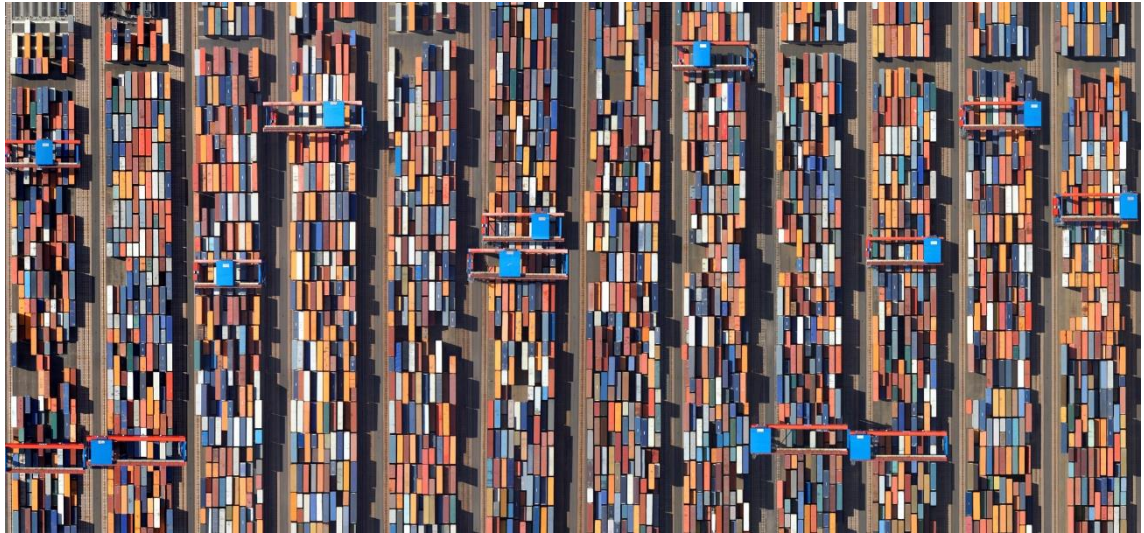# I am because we are.

- **Ethical consequences of agential realism**

Rows and rows of shipping containers filled with consumption [photo: Stephan Zirwes, www.stephanzirwes.com]
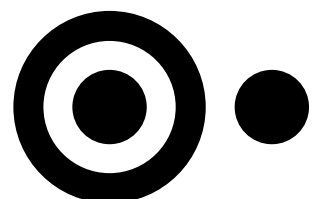
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Contents

Abstract

Within the interdisciplinary field of new materialism Karen Barad's theory of agential realism deconstructs our current euro-western metaphysical perception of the world and our existence within it, to then re-build an understanding based on relatively new findings within quantum physics. In this thesis I try to recreate Barad's theory to see what ethical consequences might come from it. Together with practical examples within the discourse of today's social world and our global connectedness I hope to create a better understanding of the impact of our actions and being on our culture and what we call the natural world. Removing the unique agency given to human culture and language to instead, with the help of post-humanistic ideas, add agency as a universal enactment rather than an attribute, we should start to see ourselves as active and real parts of the world-building that is our home. One main question that I see arise in the end is: what does responsibility entail when we all are one and the same?

Introduction

Over the last couple of decades we have seen the rise of a new interdisciplinary field, often called new materialism, challenging the discourse on matter that has been dominant in the euro-western culture for the past couple of millennia. The subject has been broad and differed in many ways, drawing inspiration from a vast array of fields such as gender studies, posthumanism, social constructivism and even quantum field theory. Since the publication of their 2007 book *Meeting the universe halfway* Karen Barad and their theory of agential realism has been one of the main contributors within new materialism. Drawing experience both from a Ph.D. in theoretical physics and current position as professor of feminist studies, philosophy and history of consciousness, Barad presents a view on existence grounded in the idea of Niels Bohr's Copenhagen interpretation of quantum mechanics. A view in some ways as old as human history, but depicted in a new light with empirical evidence to back it up; being able to confront the deeply rooted metaphysical ideas of today's school of thought.

Throughout different fields across the academic world, Barad has for the past decade been celebrated as a somewhat science rock star, their work being used and interpreted many times over on subjects like cultural theory, economics, media, social movement studies, theoretical psychology and even Hegelian philosophy. (Hollin, Forsyth, Giraud, & Potts, 2017) Critics on the other hand have not so much focused on the actual theory of agential realism, but more on the general idea of new materialism and a common misconception of agency and matter. I will later bring up a couple of examples of this, but for a broader idea I recommend the article *What is new materialism?* (Gamble, Hanan, & Nail, 2019), where the authors try to answer these and other critics.

As Barad has a background as a particle physicist there is a lot of focus on the technical side of the theory in their book. I will bring up a few of these perspectives in this introduction, but later on focus mainly on the social implications and outcomes thereof. How does this change our view on existence, and what ethical questions do we see rising up to the surface?

Creating the void

The ancient philosopher Democritus has sometimes been claimed to be the father of modern science as the first written mention of the indivisible atom is said to be traced back to him and his teacher Leucippus, almost 2500 years ago. There are in this case two important aspects that can be extracted in the sense of modern science and the dominating metaphysics of today's western world, and it is not really the idea of the actual indivisible atom. Instead, it is primarily the idea of particulars existing with some kind of void in between them, and also what this void consisted, or did not consist, of. The filling of the void is something that has been discussed since then and continues still to this day; what does the 'vacuum' of space consist of?

The later need for something to fill the void came mostly from the discovery that light moved like waves through space and the firm idea that no kind of wave could mechanically travel through nothingness, they need a medium of some sort (e.g. water or air). We see the exact same kind of mechanics working in water-, sound-, electromagnetic- and light-waves, and the

way these waves interact with themselves in different manners is called diffraction or interference[1].

This constant need over the centuries to explain the mechanical behaviour of light caused the birth of the Aether, appearing in many different shapes and forms. Even Isaac Newton who theorised that light and everything else definitely only were particles in an absolute space, needed the aether to explain some of the mechanics he observed.

Light just had to travel on, or with, something, and it could not be the void in between the 'indivisible' atoms, as we cannot have mechanical features in voidness. There is a need for resistance or an opposing force for the mechanics to engage with.

Circular water waves generated by diffraction from the narrow entrance of a flooded coastal quarry. [Verbcatcher, 2011, Wikimedia Commons]

Einstein was in some ways the first major scientist who did not include the aether in his view of the world. He managed to explain both the movement and the relativity of space and time without the need for some substance to fill a void between particular particles, as his theory did not include particulars in the same way as earlier scientists[2]. Together with other great scientists like Louis de Broglie, they managed to explain most of the universe through only waves and fundamental forces. Especially de Broglie, who developed a mathematical system to give every piece of matter a wavelength, similar to those that give us sound and light. The only problem was that the more complex the matter, the shorter the wave. And when we get to extremely complex matter such as a single molecule it is still impossible for us today to detect waves at these short lengths.[3]

Even after the removal of the Aether from the picture, the scientific world is still mostly left with the basic physics we today call Newtonian (although there were many other people from all around the world involved). This is a physical system that works well on the limited space we apply it on[4]. It is fundamentally based on particular particles that can be measured to exact precision in every aspect. And while this is still used successfully to fill most of our needs, like building bridges and skyscrapers or sending rockets to the moon, we now know that it is lacking in explaining the actual workings of the universe. Despite this we are still mostly being taught an outdated binary system in school, a system where one for example can

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[1] Diffraction in waves is defined as the bending of a wave around the corners of an obstacle (why we for example can hear someone standing behind a tree). The diffraction is dependent on the interference of waves emanating from the same source taking different paths to the same point. Karen Barad though uses these two terms, diffraction and interference, interchangeably.

[2] Finding the gravitation particle, or the 'quanta of gravity', is one of the more important research areas in theoretical physics as it would hopefully combine the theory of relativity with quantum theory .

[3] Very recent experiments have shown interference mechanics within larger groups of carbon atoms, exciting findings that continue to prove de Broglie right.

[4] Newtonian physics is based on Euclidean maths, that actually only work on impossibly flat surfaces. But when building a skyscraper there is really no problem seeing the surface as flat for that small specific area, even though we now know that space behaves as if it was curved. As soon as we start getting close to the quantum level or on such big scales that special relativity becomes an important factor, Newtonian physics fall apart.

decide the velocity of a car by pinpointing the rate of change of position with respect to time, with a static correlation between them. These fundamental Newtonian measurements give us results we need and use, but quickly break apart when applied in more complex ideas. There are many examples of this binary teaching in our education, take for example something as every-day common as boiling and freezing water. This is much more complex than the idea most of us we think we understand. Water often boils when the pressure in the water becomes higher than the pressure above it. At sea level this usually happens around what we call 100 degrees Celsius, but on top of Mount Everest water boils at 68 degrees Celsius. There are also other factors that can decide when the water actually boils, or how it boils. In the same manner water doesn't always freeze at zero degrees Celsius, it freezes when the energy levels become so low that the water particles are able to form stable patterns. For this to actually happen though we also need the introduction of a foreign element that 'disturb' the atoms and move them into order. Water without any disturbance can come to at least negative 40 degrees Celsius without freezing. (University of Utah, 2011) And we are still far away from understanding all the secrets of water, if we ever will, (Ball, 2008) but still we are being taught that we 'know' these binary facts about the life-giving substance. Even though it clearly seems to work on levels we do not really grasp, like the several thousand degrees hot black ice that seems to be the most common form of water in the universe. (Sokol, 2019)

Nothing is ever really fixed, not even knowledge. Something the science community really started to discuss with the discovery of particle entanglement[5], where the debate heated up on how one particle could know, or have the information on, another separate particle's physical state even though they were separated, theoretically, over an infinite distance. How could the information travel at seemingly infinite speeds and break all our mathematical rules? What does this do to the fundamental truths that are the laws of our universe?[6] Questions that continues to haunt physicists to this day.

What I think Karen Barad wants to do in their book *Meeting the universe halfway* is to say that all these questions are actually unnecessary, and the only reason they appear is because we started this whole thing at the wrong end.

A new foundation

More importantly, the idea of particular particles in a void has not only influenced the natural sciences, it effects practically every field of academic study and our day-to-day view of the world, as its concept would undermine the basic western metaphysical view of our existence. The main method of research throughout European history has been in the way of the 'objective' (almost always white and cis-male) observer, only seeing the world as filled with other separate and foreign individual entities, and studying how they correlate directly to the observer. The title of this thesis (I am because we are) comes from an Ubuntu saying in

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[5] The notion that two particles, separated by endlessly large distances, could instantly exchange information between each other. This goes against the fundamental idea that information only can travel at the presumed maximum 'speed' (energy) of the universe; the speed of light.

[6] We have today two theoretical limits to the energy of spacetime, the maximum amount as shown in the speed of light, and the minimum as shown in Planck's constant. Without these boundaries our mathematics of the physical and quantum world do not add up.

southern Africa. The core belief system in these and other areas of the world have often contained the idea that we are all connected and fundamentally dependent on each other; my individual existence is entirely conditioned on the existence of the whole, a view in many ways different from the individualistic one fostered in a post-catholic and post-renaissance Europe.

Following in the footsteps of the physicist Niels Bohr, Barad takes the knowledge we gained from quantum physics, especially wave-particle duality and supersymmetry, and say that we should not see the universe as particles sometimes behaving like waves. Instead it would make a lot more sense to view the universe as waves sometimes manifesting as particles, eliminating the need or even want for a void. It is through complex and iterating interference we create actual matter.

This idea of wave interference does not only solve several problems in the natural sciences[7] but also provides us with many fascinating responses to old and new conundrums in the social sciences, resulting in a new understanding of both our own knowledge and our view of existence. This, together with the ethical implications that follow, gives light to Barad's idea of an *ethico-onto-epistem-ology*.

I will in the first part of this thesis try to do a reconstruction of the theory of agential realism, as it is mostly realised in chapter four of Karen Barad's book. In the appendix I will leave links to useful videos explaining on a deeper level the actual physics that lies behind the framework for those interested. My hope is though that after finishing this thesis the reader will have a good idea of what Barad is trying to do, even without a full understanding of the physics behind it. My belief is that the common knowledge of the quantum world has become widespread in a fashion that does not make the idea of entanglement and superposition sound so strange anymore. Just like we don't think about the strangeness of negative numbers or the zero; they are nowadays fundamental parts of our discourse. The possibility for a particle to change position instantly or be forever entangled isn't such an outlandish concept for some of the newer generations.[8]

I will initially focus on the break away from the objective observer and introduce Barad's new idea for performative research and the sometimes problematic role of measurement. This will be followed by a discussion of agency, post-humanism and the physical boundaries of the modern human body, together creating a broader idea of human and non-human apparatuses relating to each other, and how we perceive this enactment that creates the cuts that create our boundaries. Is it in these border creating cuts that we can find agency?

In setting the actual groundwork for agential realism I think it is important to not use too many human sized or cultural concepts, but to focus on the quantifiable *realism*; we are talking about the actual creation and evolution of matter itself. The physics and metaphysics are in many ways one and the same here. Every apparatus is as real as the next one, even if

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[7] There is a field within the natural sciences called relationism, recently explored by physicist Carlo Rovelli, that base their research on similar grounds but with the addition of removing the existence of even waves as a particular at the fundamental level (https://plato.stanford.edu/entries/qm-relational/).

[8] The understanding of the consequences from this are still far from being understood though, even in the scientific community.

we are talking about consumption, the electron or a rock. They all alter other apparatuses around them through a performative way of action.

The second part will on the other hand focus on the intra-connectivity of modern society and the possible ethical outcomes that come from agential realism. If we take Barad's metaphysics as a new standard for our discourse it could change a lot of our common beliefs and understandings of existence. What is responsibility in a world were both none and all choices are our own? Are we responsible for everything? In this section I will use a broader range of secondary literature, some that Barad themselves bring forth such as the writings of Levinas and Derrida, but also news articles and YouTube videos as they are an important part of our current social world's discourse and narrative. I will additionally try to connect this material to important questions we are facing today, including consumption, nuclear and climate threats, and the concept of life and death. Everything and anything can ultimately be tied together through the eye of agential realism.

As a small side note I want to finish this introduction with a gentle reminder on the kind of scales we are talking about on the fundamental level, as I think it is important to remember both the size- and timescale of what is in focus. The evolution of bodies, both biological and non-biological took place over billions (several thousand millions) of years, where my intuitive knowledge is always tied to the experiences of my own average day. The concept of billions of years is fundamentally an exceedingly difficult thing for humans to comprehend in a social sense.
For a better understanding of the size scale I recommend this beautiful *Scale of the universe* project done by Cary Huang, showing how we are both giants and miniatures in our world at the same time. Please take some time to realise the greatness that is told here, for example that the difference between us humans and the whole observable universe is about the same as the difference between us and the smallest particles: https://htwins.net/scale2/. [9]

One of the basic building blocks in the universe as we know of today is the electron. There are a lot of comparisons to what the electron 'looks' like as it 'orbits' around the nucleus of the atom. All of this is really an anthropomorphic idea of the inner workings of the atom, there is no motion or imagery as we know it on this scale. Everything we try to picture about it is most often fundamentally wrong in one way or another. When an electron changes orbit around the nucleus it doesn't move over time, it is instant. They constantly inhabit all possible 'positions' (charges) until observed, with no way of knowing the actual outcome beforehand, only the chances for different ones.

The set of physical rules applied on both the smallest and largest scales in our universe are completely different to those we usually take for granted in our every-day lives. So have an open mind!

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[9] For a detailed explanation of what is going on within the different scales you can see the older project "The universe within" here: https://micro.magnet.fsu.edu/primer/java/scienceopticsu/powersof10/index.html

Part 1: What is agential realism?

To fully explore the topic of agential realism I think it would be useful to first point out a few norms of this modern age's discourse in order to challenge them, something that has previously been done separately in several different research areas. These norms include among other things the idea of the objective observer, human boundaries, the creation and role of agency, and what we like to call the building blocks of the universe.

Performative research

Beginning in the 1950's the first mentions of performativity started to show up as a way to differentiate between the more common analytical language model of logic (where we can extrapolate a truth or false value from distinct sentences) and speech acts, as theorised by J.L Austin. Speech acts, or performative utterances, were defined by Austin as such: "though they may take the form of a typical indicative sentence, performative sentences are not used to describe (or "constate") and are thus not true or false; they have no truth-value. Second, to utter one of these sentences in appropriate circumstances is not just to 'say' something, but rather to perform a certain kind of action". (Austin, 1975) This idea followed a long standing analytical tradition of creating rigid systems for language where everything was supposed to be broken down to its smallest underlying semantic parts, to be able to deduct a truth or false statement. From these statements we would then be able to build our fundamental knowledge of existence, or so the thought went.

> How did language come to be more trustworthy than matter? Why are language and culture granted their own agency and historicity, while matter is figured as passive and immutable or at best inherits a potential for change derivatively from language and culture? (Barad, 2007, p. 132)

Several people continued to work with the idea of performativity and the effect of language and culture, especially Judith Butler in their 1990 book *Gender Trouble: Feminism and the Subversion of Identity*. There they created a link between performativity and gender, expressing that gender is constructed and active: "gender proves to be performative - that is, constituting the identity it is purported to be. In this sense, gender is always a doing, though not a doing by a subject who might be said to pre-exist the deed".

Together with both Butler's ideas and the social constructivism developed by among others Michel Foucault, Barad takes a step further and claims we need to let go of the unique agency we continue to give human beings, and our language and culture. "for both Butler and Foucault, agency belongs only to the human domain … That is, both accounts honour the nature-culture binary" (Barad, 2007, pp. 145-146). Here Barad instead brings us back to Niels Bohr who proposed a new metaphysical system where the measuring apparatuses used in scientific experiments are given the same subjective status as the experiment itself. This proposal came about in the beginning of the 1900s when the scientific community started to realise the strange rules that govern our quantum world, and that changing the way we

measure could manipulate the results.[10] There was a real need to see the apparatus of measurement as a performative actor in the experiments, and to be able to replicate the results the researchers had to take in full account how the measurements were made.

So if we regard both of these worldviews we would neither consider scientific results nor culture as something fixed and objective. Instead of seeing a clash, Barad sees here an opportunity for something grander. Both views could be considered to be correct, and we would just need to take a step back to see the whole picture.

> While Foucault's genealogical analysis focuses on the production of human bodies, to the exclusion of nonhuman bodies whose constitution he takes for granted, Bohr is attentive to the production of nonhuman phenomena and takes for granted the prior existence of a human observer. (Barad, 2007, p. 169)

Contrasting this idea of performative research Barad sets up representationalism as the common view today, where humans tend to put themselves above or outside the world we merely reflect on. (Barad, 2007, p. 133) The act of reflection is used as a metaphor by Donna Haraway in her 1992 paper *The promises of monsters*, where she brings up the idea of diffraction as a better choice of word for describing our observing of the world around us. Reflection gives the idea of something permanent and non-changing, while diffraction, as I've discussed in the introduction, is the constant interplay between the same kind of system. It also does not set which is the subject and which is the object beforehand as reflection tends to do (the subject reflecting on the object); all parts start on equal terms.
Diffraction, as Barad also mentions, is a well suited metaphor for the role of entanglement in the quantum world and for performative research alike. We both metaphorically and physically become entangled in the act of observation and with the thing we observe; as all three of the observer, the observation, and the observed interact performatively. Or **intra-act** as Barad would prefer.

Phenomena and apparatuses

If we break down all human and non-human parts into the same phenomena, governed by the same rules, they all become one single system acting on itself. Therefore does **intra**-act become the correct choice of words, as **inter**-act on the other hand implies two or more separate, pre-existing and self-functioning systems acting on each other. Perceiving our existence from this perspective can open up new logical outcomes in several different academic areas.

> the primary ontological unit is not independent objects with independently determinate boundaries and properties but rather what Bohr terms 'phenomena'. (Barad, 2007, p. 33)

Phenomena is more than just a particular building block, phenomena is everything contained and entangled in one system, a system that is always generating and dissipating parts in an ever ongoing measurement. "Reality is composed not of things-in-themselves or things-behind-phenomena but of things-in-phenomena". (Barad, 2007, p. 140) According to

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[10] Niels Bohr's philosophy-physics is discussed in length in chapter three of *Meeting the universe halfway*.

quantum physics as soon as humans or non-humans alike measure (observe or intra-act with) something it is in some ways fixated, it creates specific boundaries. That specific part of the system breaks down from being all the possibilities at once, to being one particular possibility. These boundaries of possibility are still by no means fixated or even stable. An apparatus for measuring (containing all three apparatuses of the observer, the observed and the observation) must itself have the ability to be measured, and when it is it becomes part of a new apparatus of measuring, and that apparatus is also part of other apparatuses, in an ever ongoing and changing circle of apparatuses measuring the universe measuring itself. These apparatuses are the practices with which we create divisions, that allow the dynamic materialisation of bodies through intra-activity, also creating the possibility of objectivity. And still, apparatuses are themselves phenomena, and more importantly the bodies created, even human-bodies, are not entities with inherent borders and properties. They are also phenomena, part of the world-body in its ongoing dynamic structuration of boundaries. (Barad, 2007, p. 172)

Agential cuts and agency

It is important to remember that these boundaries are not only semantic, but also very much ontic. They create both ideas and bodies, in a real sense. Barad leans on the discussions within posthumanism that blur the lines especially between our own human bodies and the rest of the world. What at first glance seems like an easy border to spot can quickly become questionable.

> Realism, then, is not about representations of an independent reality but about the real consequences, interventions, creative possibilities and responsibilities of intra-acting within and as part of the world. (Barad, 2007, p. 37)

In several anecdotes Barad brings up writings on the human body experience and its boundaries, mostly about vision and other senses. One of the more interesting examples are from Lisa Diedrich and her 2001 article *Breaking down: a phenomenology of disability*, where she writes about Nancy Mairs's autobiography and the (almost always) trustworthy electric wheelchair she uses, the "Quickie P100".

> [Quickie P100] is not only an extension of her body or "a bodily auxiliary," as Merleau-Ponty calls a bling person's cane, but has become incorporated, made part of her body – so much so that when the Quickie P100 breaks down, it is the breakdown not simply of an instrument employed by the body but of Mairs's very self. According to Mairs, "the wheelchair I experience is not 'out there' for me to observe, any more than the rest of my body, and I'm invariably shocked at the sight of myself hunched in its black framework of aluminum and plastic". In her Quickie P100, Mairs is at one and the same time positioned and situated in the world. (Diedrich, 2001)

We will have reason to come back to Mairs and her Quickie P100 later when discussing ethical outcomes, but for now let's focus on what this does to our understanding of the human body's borders and exclusions. In Mairs' experience we can understand that the Quickie P100 is indeed part of her body, even though it seems intuitively easy to still draw a line between what normally is seen as biological boundaries and non-biological boundaries. But this is

where it is important to remember that Barad is not trying to change the physical essence of the non-human objects or make them into culture and words, those two already have too much power. Realism in this sense isn't about adding a category of agents, "Rather, the point is that the very practices of differentiating the 'human' from the 'nonhuman', the 'animate' from the 'inanimate', and the 'cultural' from the 'natural' produce crucial materializing effects that are unaccounted for by starting an analysis after these boundaries are in place." (Barad, 2011)

Some people have brought this up as a point of criticism, the fact that non-biological materials would 'gain agency' and therefore have the possibility of both taking action and knowing. Andreas Malm is one of them in his book *The progress of this storm*, where he discusses new materialism in relation to the on-going climate emergency. He shortly brings up Karen Barad, but sums most of the theories up with an idea of giving agency to non-human entities, and the absurdity he thinks is derived therefrom.

> a theory that partitions agency so that unintended consequences are seen as the outcome of some material actant is also a theory that evacuates the world of recklessness, improvidence, liability, responsibility and a whole range of other moral parameters. The parents of the dead infant would be asked to vent their anger on the wind. (Malm, 2018, p. 95)

This level of ridicule is constant throughout Malm's chapter and as I think I'll be able to show has no support in the material available. Sure you can blame the flapping of a butterfly's wings for the death of a loved one, in some reality I'm sure you could even draw a causal line between the two, but there is a need to be reasonable in our discussions on agency and causality, and identify the larger, or more intricate, apparatuses that actually substantially mark the phenomena we are investigating, and not pay so much interest to the insignificant ones. Agential realism is not about giving agency to non-human and non-biological apparatuses in the same way it has been given to humans and our culture and language, an idea that is common for critics of new materialism. Barad is instead taking it away from all of them.

Causation plays an especially important role in both the ethical questions and the onto-epistemological sense of agential realism. Already in the introduction of their book Barad writes that the problem with how we mostly view causality today is that it is totally binary: you either have free choice or determinism, and nothing else. (Barad, 2007, p. 23) Free choice and causation certainly exists within agential realism, it just isn't a direct link between two separate bodies. Every cause within phenomena leaves a mark upon the bodies involved. The larger, or more intricate, apparatus is also causally significant, in a sense leaving a larger mark on the bodies involved. These marks Barad calls marks of measurement, as every causal intra-action can be seen as an act of measurement. Barad continues that this could also be seen "as part of the universe making itself intelligible to another part in its ongoing differentiating intelligibility and materialization".

> Either way, what is important about causal intra-actions is that "marks are left on bodies": bodies differentially materialize as particular patterns of the world as a result of the specific cuts and reconfigurings that are enacted. Cause and effect emerge through intra-actions. Agential intra-actions are causal enactments. (Barad, 2007, p. 176)

What Barad tells us is that apparatuses are boundary-making practices, they enact what matters and what is excluded from mattering. (Barad, 2007, p. 148) In the creation and intra-action of apparatuses there is an *agential cut* appearing creating these boundaries. Agential cuts are what enact agency, and the cuts themselves are not enacted from the outside, it is in the relation and intra-action between apparatuses that the cuts appear. In the case of Mairs and Quickie there is an agential cut creating agency for the whole body that is Mairs, including the electric wheelchair. [11]

> the primary ontological units are not "things" but phenomena … And the primary semantic units are not "words" but material-discursive practices through which (ontic and semantic) boundaries are constituted. This dynamism is agency. Agency is not an attribute but the ongoing reconfigurings of the world. (Barad, 2007, p. 141)

Agency is not an attribute, it is dynamism. It is an intra-acting enactment. It cannot be designated as an attribute of subjects or objects as they do not pre-exist as such. (Barad, 2007, p. 178) When any boundary is made within phenomena there is an automatic exclusion of everything outside the apparatus, creating a relation between what is included and what is excluded, and the constantly iterating intra-action between the two. It is in this sense impossible to create an individual and separate apparatus within the phenomena as a whole.

The act of agential cuts does also leave a mark on the apparatus, and here Barad uses the analogy of tree rings (even though they themselves admit that it is lacking in many ways, as all human size metaphors are in this regard). I think one important aspect of the analogy is that it shows something that we perhaps normally don't see as a direct and active physical enactment (in the same sense as say an insect burrowing into the tree) but more the idea of time itself leaving its marks as it passes by. Apparatuses are 'marked' by the agential cuts they encounter, as experiences change and leave inner markings on people.

> As the rings of trees mark the sedimented history of their intra-actions within and as part of the world, so matter carries within itself the sedimented historialities of the practices through which it is produced as part of its ongoing becoming. (Barad, 2007, p. 180)

I think it becomes apparent that our own daily decisions mark all other apparatuses around us, giving the idea that we are responsible for everything that happens in the world. But it is important to remember that we are not the ones re/enacting the cuts and creation, the agency is in the cut itself, caused by all apparatuses and all of phenomena. "We are responsible for the cuts we help enact not because we do the choosing … but because we are an agential part of the material becoming of the universe." (Barad, 2007, p. 178). In the next part of this thesis I will try to build a deeper understanding of just what this idea of responsibility means within the ethical consequences of agential realism.

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[11] Ontic examples on this scale and level are, as I've mentioned, difficult. In this case there are a seemingly infinite amount of cuts and apparatuses needed in the creation of Mairs and Quickie. If we see it as one (1) cut we easily loose the realistic and materialistic strength we can find in agential realism and only regard it as semantic.

Part 2: Forgetting the void

Ethics of mattering

Opening the last chapter of Barad's book is a quote from philosopher Emmanuel Levinas: "Proximity, difference which is non-indifference, is responsibility" (Barad, 2007, p. 391). Levinas, according to Barad, is rejecting the metaphysics based on the individual self and instead saying that ethics are a relation of responsibility to the other. A responsibility that is not a response to the other, for our ethics are embodied within the relation creating an ethical accountability, or in a relational sense: "response-ability". (Barad, 2012) From the metaphysics that is agential realism we can see an instantaneous accountability created, one that we share with everyone and everything, as beings of the world's becoming, bringing forth possible answers to old ethical questions, and at the same time creating new ones.

Barad goes on writing that "the otherness of the Other is given in responsibility." (Barad, 2007, p. 391) Our entanglement with each other and the world is determined in the ever-changing moment by agential cuts made within the phenomena, no subject is prior any objects. The aspect of otherness is not a matter of pre-existing individuals facing a world of objects; otherness is created when relational exclusions and inclusions are made in the creation of an apparatus. "Ethics is therefore not about right response to a radically exterior/ized other, but about responsibility and accountability for the lively relationalities of becoming of which we are a part." (Barad, 2007, p. 393)

This last passage of the book also brings up physicist Freeman Dyson and his autobiography *Disturbing the universe*. The title comes from a question posed by T.S. Eliot's character Prufrock: "Do I dare disturb the universe?". For Dyson this question seems exceedingly important as he worked on the atom bomb and lived to see the many consequences of it. "Knowledge implies responsibility" he wrote, "it is not possible to make a clean separation between peaceful and warlike bombs, or between peaceful and warlike motives". In the same logic, Barad argues, we can't really separate between disturbing and not disturbing. In order to choose to disturb something you must come from the outside having the alternative to not interfere and only be an excluded observer, something that is not possible with agential realism. (Barad, 2007, p. 396) We have no choice in the matter as we are always part of the universe apparatus, we are always disturbing and not disturbing at the same time. It all depends on how you view the matter at hand.

In one of Barads latest articles they discuss the many impacts of the nuclear testing in and around the Marshall islands during the 1950's. During these tests 67 (!) nuclear bombs were detonated on and above the islands and coral reefs, some of them a 1000 times larger than the bomb over Hiroshima. The women living there are still today giving (defect) birth to what they themselves call "jellyfish" or "grapes", one of many effects of the radiation that to this day is still being released from the sediments. (Barad, 2019) Bringing forth the concept of Jacques Derrida's hospitality, Barad takes the concept further to a matter of *radical hospitality*, in a world still filled to the brim with colonialism. A matter lingering in the so-called void inside the cover-up cement dome on what once was the island of Runit.

> The classical Newtonian notion of the void might have served as a much-valued apparatus in the service of colonialism. But according to [Quantum Field Theory] the void is not the background against which something happens, something matters, something appears, but rather, an active constitutive part of every "thing." As such, *even the smallest bits of matter—are haunted by, indeed, constituted by, the indeterminate wanderings of an infinity of possible time-beings—a radical hospitality* (Barad, 2019. Barad's emphasis)

The dome on Runit, encapsulating nuclear decay, capitalism and colonialism alike [public domain]

To have a home there must be strangers relating to the home, guests that could experience hospitality. Whose home was the Bikini Atoll and who was the guest at the nuclear testing grounds? Barad cites a report made on the matter where the authors wrote: "In 1947 the United Nations designated the Marshall Islands a US trust territory. Over the next eleven years, this US territory played host to another sixty-five atmospheric atomic and thermo-nuclear tests". The significance in the choice of words here can be difficult to comprehend at first according to Barad, especially "playing host" decides both that the islands are the current home of the US government and that the guests are the bombs. The inhabitants of the Bikini Atoll were forced from what used to be their home for "the good of mankind", and "labeling of the atoll as 'natural' served to erase the social history of the Bikinian people in their place." (ibid.) This question of hospitality I think ties back into the so called 'disturbance' we cause our world, as our climate crisis and nuclear threats. Whose home is the world we walk on?

So in an existence of seemingly endless crisis and disasters, what does agential realism tell us? As we approach the ethical consequences of the theory I believe it is justifiable to use human-sized intra-acting apparatus, being able to do so without taking away the importance of the fundamental idea of actual matter creation. It can be useful to embody this fundamental view of matter entanglement even on the larger scale to be able to realise the impact of our intra-activity with the world and universe.

We as humans have throughout our history instinctively divided ourselves or our tribe as subjects on one side and the rest of the world as objects on the other side, objects against who we must survive. The apparatus boundaries of the subject are always fluctuating, constantly shifting between just yourself, your family, your village or workplace and so forth depending on situation and circumstances. The increase of this subject boundary escalate the more we communicate, engage and cooperate with each other and the material world, reaching an increasingly exponential growth in the past couple of centuries.

With the help from frameworks such as intersectionality we have become aware of the difficulty of identifying all the possible aspects of our being and belonging. However, we know that the global intra-connectivity of humans started long ago. Through trade, war and slavery our cultural borders have expanded and diminished throughout the millennia, creating huge apparatuses already covering half the planet hundreds of years ago. The apparatus of having a cup of tea in London in 1650 involved a great deal of phenomena: farmers in south Asia, traders at different stations along the way, sailors, donkeys, shop owners, ship builders, wagon builders, porcelain makers, wood workers, government officials, paper makers,

military; the list can go on for ages and probably includes thousands of people, if not tens of thousands. And each of these bodies were part of their own apparatuses including everything they intra-acted with in one way or another, also creating unique identities within all of them.

At the same time in this part of our history it was still relatively easy to find ostensibly independent human apparatuses. Villages in different corners of the world that were more or less self-sufficient; they made their own tables, mugs and drinks, and took their own decisions on how to govern their life with no apparent outside effect (on a human level). A human instance like this is something that I believe is exceedingly difficult to find today. We have reached the point of global connectivity where more or less every individual on the planet is only separated on average by 3,6 steps, if Facebook's claims are to be taken as true at least (Edunov, Bhagat, Burke, Diuk, & Filiz, 2016). Since the 1960's there have been studies on the so-called small world theory and how we are becoming more and more intra-connected. It seems like every decision I make, every step I take, effects everything else. If I went to buy a cup of tea at my local coffee shop today I'm sure I could connect that single action to more or less everyone on the planet once you really start to connect all the lines. Just the cup I'm holding would probably do, with all the machines included in the creation of the cup, the machines included in the creation of the machines that made the cup, the machines that created the machines that create the spare parts for the machines that made the cup, and all the machines included in the trade, the sales, the management, the owners, the workers, their family and so on. In an advanced and utterly global market economy we are all connected through our consumption, and in the end through our materialism. In several parts of the world today it is easier to find a cold Coca-Cola then it is to find drinkable water (Díaz, 2020), demanding a huge and intricate apparatus to deliver something that fills the most basic of our needs. And it's happening practically all the time, our lives are filled to the brim with intra-connecting consumption both physical and digital. The IT worker-rights in south-east Asia, mines in central Africa, diabetes in central America; all of this effects my daily life, and my daily life effects them. It might be the smallest of effects, almost undetectable in some instances, but there definitively is causality in both directions. My action creates agency in its agential cutting, adding ripple effects (interference) and marking the phenomena I relate to.

This brings us back to the apparatus of Mairs and her Quickie P100. The pair do not, as Barad tells us, exist independently. They are an apparatus of what is, among other things, regarded to be disabledness, in relation to the able-bodiedness of my own being. I view Marnie in a certain state only because the way I view myself, we are both dependant on the relation between us.

> The luxury of taking for granted the nature of the body as it negotiates a world constructed specifically with an image of "normal" embodiment in mind is enabled by the privileges of ableism. It is when the body doesn't work – when the body "breaks down" – that such presuppositions generally surface. It is often only when things stop working that the apparatus is first noticed … "able-bodiedness" is not a natural state of being but a specific form of embodiment that is co-constituted through the boundary-making practices that distinguish "able-bodied" from "disabled" … What would it mean to acknowledge that the "able-bodied" depend on the "disabled" for their very existence? What would it mean to take on that responsibility? (Barad, 2019, p. 158)

The same kind of entangled relation we see here is brought up in chapter five of *Meeting the universe halfway*, where Barad gives an example in the form of the invention of an ultrasound machine. Including this apparatus of measurement into the medical discourse granted an every-day creation of previously rare agency toward unborn fetuses, and in a binary world this came at the cost of the agency of the mother. (Barad, 2007, pp. 199, 216) As everything else though this was not an entirely problematic thing either. Barad asks where we would be in the evolution of midwifery as a feminist answer to "(over)medicalized birthing practices" without the acknowledgment of the fetus "kicking back"? (ibid.) Today we often see the fetus as a free-floating agent, absent from the pregnant woman. In the eye of agential realism "the fetus is not a preexisting object of investigation with inherent properties. Rather, the fetus is a phenomenon that is constituted and reconstituted out of historically and culturally specific iterative intra-actions of material-discursive apparatuses of bodily production." (Barad, 2007, p. 217) The whole apparatus includes everything about the pregnant person: fetus, uterus, placenta, hormones, nutrients, emotions, as well as their surroundings and other intra-acting apparatuses that engage them. The combining of an egg and sperm does not create new agency attributed a fetus, it only reshapes the already existing boundaries of the apparatus that is the person becoming pregnant.

This idea does of course not just include humans, for instance the meat-farm industry is the cause of torturing distress for tens of billions of individuals every day (Thornton, 2019). The act of being tortured creates agential cuts that marks our own bodily apparatuses as well as the world apparatus, in turn marking all phenomena within. Even if we don't buy the meat from the factories, are we still responsible as we are part of the world-building apparatus? In a sense all of our nowadays mundane daily actions comes at great cost of what we normally see as the planet's biological life. Taking a short bus ride includes the destruction of countless ecosystems as a result of construction: building the bus, paving the roads, creating training facilities for the bus drivers, server storage for online ticket buying, coffee and tea for the transport planners, the production of the clothes I 'have' to wear to be able to go outdoors and take the bus, air traffic controllers that make sure that airplanes don't come crashing down on me. The list can again go on almost forever. We have created an extremely intricate web of intra-connectivity throughout the entire world, in every aspect of our life, a brand new ecological system in some ways, one that can't be avoided. My actions, or inactions, never seem to be my own. In my reading of Barad I see that my actions are forever, both the ones I'm proud of and the ones that I consider to be a mistake. Trying to rid oneself of mistakes made, makes one blind to the whole apparatus that is oneself. We need to embrace our whole apparatus, both as individuals and as groups and societies. The apparatus is marked from our failures and cannot be unmarked. Even in what we call death, our individual apparatus continues to mark others with all the choices we made along the way.

In the eyes of new materialism we could see that death is not a state separate from life, as sociologist Peta Hinton brings up in the book *What if culture was nature all along?*, citing influential new materialist Vicky Kirby, as well as the work of Barad. As with the case with the entanglement of the apparatus of dis/ableness there is no death without life, and vice

versa. "One way of putting this, with the help of Barad, is that death is constitutive as the very im/possibility of life itself." (Hinton, 2017)

Even in the world of empirical science, the more we learn about biological life forms and the variety thereof the more we understand that life and death really is not binary, it is a spectrum in several dimensions. The simplest idea of what counts as life in the universe can change many times over the years depending on the area of research. (Gabbatiss, 2017) Even in the human sense, the idea of life and death is something that has caused a lot of discussion lately, with philosopher Peter Singer leading a provocative and interesting case for definition, especially with the idea of *why* we want to define death (is it just to be able to harvest organs?). In his book *Rethinking life & death, the collapse of our traditional ethics*, Singer brings up the medical innovations that has changed our perception of death over the past decades. "Isn't it odd that for a human being to die requires a different concept of death from that which we apply to other living things?" (Singer, 1995) Singer claims that with the invention of things like the respirator and heart transplantation, we no longer have a clear idea of what is considered to be a dead person. Tens of thousands of people have been kept alive in a "vegetative" state for decades all around the world, while others have instantly been declared dead when the brain is seen as permanently damaged, in order to use their organs. (ibid.) So if we see the concept of life as a whole apparatus of multi-dimensional spectrums, varying for example in factors like consciousness and decision making ability, death seems to be left out of the picture, it doesn't really fit in anymore in a non-binary world. If nothing is ever completely alive or completely dead, existence becomes im/permanent within the world apparatus, being both eternal but also never really existing as a separate instance on its own. The reality of our human consciousness would exist in the same manner of matter as our body, AI or the electron. Something I will try to delve deeper into in the next section.

Knowledge

Returning to the social age of today it seems we are no longer dependant on physical or geographical limits, or even our own bodies. With the rise of apps like TikTok we see the fast creation of many new tribes and cultures across the globe. It's not just meaningless entertainment, people are connecting and creating completely new agential cuts from different corners of the world, sharing in meaningful and powerful society-changing activity. (Choy, 2021) The social platform together with the incorporated AI becomes an active player and agent in the creation of the apparatuses, as the AI is the one that most often decides what you get to see, or even produce as not even writing is an act exclusively carried out by human agents anymore. In a talk at the San Francisco library in 2019 Thomas Mullaney, professor of Chinese history at Stanford University, describes the evolution of what he calls 'hypography' as a new way to communicate through the written word. In the talk Mullaney explains that we no longer always have direct causation between writing and human communication, as an AI most often helps us and creates its own steps in between input and output, steps like automatically correcting spelling, completing words and even suggesting the next phrase or synonyms. What used to be a natural evolution of language is then hindered as all the otherwise natural occurring changes to the language within the speaking and writing

population are deleted once the AI has identified the 'correct' output. (Mullaney, 2019) The apparatus and therefore the creation of agency through writing has extended from previously mainly including the hand and thought, to now include a whole network of extremely powerful computing, talking to each other without us ever knowing what they are discussing[12].

So do the machines 'know' something we do not when they communicate between each other? What does it mean that the information exchanged isn't saved for later scrutiny? Is the knowledge then lost as it is only available to computer programs that we can't communicate with?

> knowing is a matter of part of the world making itself intelligible to another part. Practices of knowing and being are not isolable; they are mutually implicated. We don't obtain knowledge by standing outside the world; we know because we are of the world. (Barad, 2007, p. 185)

Barad apparently gives the act of knowing to the AI systems, as they are part of the world apparatus, intra-acting with each other and us, gaining and reproducing information. We should remember though that agential realism does not draw a connecting line between knowing and agency, so we would not suddenly give agency to an AI that wasn't there before. But their existence is rooted with their knowledge, that also implies a system of ethics (ethico-onto-epistem-ology) that we normally would only give to humans.

This important question regarding the knowledge and ethics of AI systems has seen a rise in recent years with for example the fast increase of interest on autonomous cars. In the beginning of this new technology everybody praised the fact that accidents in traffic would drastically decrease when the sometimes clumsy hand of the human driver was out of the picture. Although we quickly saw a difficult question arise: who decides what the AI decides? We have yet to program an entirely autonomous piece of technology, we still need to feed the system an exceptionally large base of ideas and examples for it to draw from in order for the algorithms to be effective at what they do. And as we are still only human there are of course programmers with presupposed ideas and biases behind the computer screens making these decisions on what those examples should be, creating a lot of racist and bigot programs. (Buranyi, 2017) The knowledge that the AI has access to effects everyone, as we transfer complicated ethical questions posed by humanity for centuries to these robots, that now make a great number of our often mundane daily decisions for us. Take the trolley problem for example: a timeless ethical question to either save the few by doing nothing, or save the many by taking an action but with the sacrifice of the few. With the idea of autonomous cars we could think we hand this problem over to the AI, but that at a second glance is a bit more complicated than that. For instance if you are riding a self-driving car down the road and the breaks suddenly stop working, the car can be put to a choice: swerve off the road and maybe killing the passengers or continue forward and maybe kill the people

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[12] Once a deep learning algorithm (AI) has started to develop its own pre-specified talents, human programmers quickly lose control of the language used within and have a hard time following it. The Google Neural Machine Translation for example 'invented' its own interlingua to make translations better and faster, a language no one else understands: https://www.wired.co.uk/article/google-ai-language-create

walking across the street? What if the passengers are a family with a new-born baby and the people walking over the street are all senior citizens, should this affect the choice? How do we decide these parameters for the AI? With the project *The Moral Machine experiment* the authors posed this and many more questions to millions of people all around the world, showing images of different situations and asking how the car should react, with regard to nine different parameters[13]. (Awad, Dsouza, & Kim, 2018) Feeding the outcome from this to the AI gives it more 'knowledge' and provides it with a base for decision making. Is this enough for us to trust them? A question probably no one has the answer to yet.

In my understanding of agential realism the AI apparatus as it exists today fits entirely within the human apparatus. We ourselves are a produce of and privy to the world building apparatus as a whole, but the AI is only aware of the knowledge we humans consciously have and decide to share with it, with no room to grow outside its set borders. A self-driving car will never *want* to become a photographer, and a photographing phone will never *want* to drive a car. It can only use the information we hand to it; the choices it makes and the agential cuts that it in turn creates are only an extension of the human apparatus and the ethics that come with it. Human growth as we know it is beyond the reach of the AI alone.

Objectivity

Knowing, measuring and materialising; they are all part of the same iteratively intra-acting phenomena, none of them are ontologically or epistemologically prior the other. Meaning comes from knowing, but is not a property of individual words or groupings of them. Meaning is always changing, but as humans we are able to communicate the parameters surrounding our measurements creating the conditions for the possibility of being objective; "objectivity is a matter of the unambiguous communication of the results of reproducible experiments." (Barad, 2007, p. 174) As we can see, the every-day practical scientific implications does not have to change significantly from the original ideas of Bohr. The importance of the act of precise measurement was already to be included in the full apparatus of objective knowing in the empirical sciences, we just need to also include this in every other aspect of our existence. There is objectivity in a performative, non-binary world of spectrums. We just need the right tools for communication, being able to observe the markings and cuts created, and to remember that even with objectivity everything is still prone to change, be it gender or the velocity of a car. Mistakes will be made.

> the particular configuration that an apparatus takes is not an arbitrary construction of "our" choosing … they are open-ended practices involving specific intra-actions of humans and nonhumans (Barad, 2007, p. 171)

In the same way that we can have ostensible objectivity in scientific experiments or ethical questions, we could view our own material becoming as an objectivity of mattering. I see myself as the thinking individual I am at this moment, and I can communicate the parameters

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[13] Sparing humans (versus pets), staying on course (versus swerving), sparing passengers (versus pedestrians), sparing more lives (versus fewer lives), sparing men (versus women), sparing the young (versus the elderly), sparing pedestrians who cross legally (versus jaywalking), sparing the fit (versus the less fit), and sparing those with higher social status (versus lower social status).

surrounding the mattering matter that is me to other people I intra-act with in my daily life, both verbally and non-verbally. This view of parameters is not always in unison with everyone else on the other hand (also a common problem within different scientific fields[14]). My parents for instance often see me as someone quite different from the person I myself conceive of. They incorporate all historical parts of my apparatus, from the helpless infant to the sad teenager and so on, into one being, all parts still very much existing and real in the person I am today. Parts that I still might have tried to shed off and forget about in the creation of the apparatus I would like to see myself as. Something we can be brutally reminded of at family gatherings, if we are lucky enough to have those.

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[14] See the replication crisis in psychology as an example

Part 3: Conclusion

The inseparability of knowing, existing and acting gives us Barad's "ethico-onto-epistem-ology". In many ways not a new idea, but brought together in a sense that I believe we haven't seen before. Changing our discourse to see past our own primacy, recognising the importance of our relations and the realism of our actions, hopefully creates a way for us to move forward in a world that no longer wants to regard everything else as otherness. Our tribes are spreading far past geographical, biological and physical boundaries connecting us with each-other as humans and non-humans alike, and also showing the impact we have on everything around us, both in the moment and throughout time.

Tying back to the philosophy of ubuntu, the aspect that for me has been the hardest to grasp is the idea of forgoing the strong feeling of your own individuality. This is something that I assume comes naturally for most people, within our world of individualistic consumption. If this is the case of 'natural' instinct or the fault of the euro-western metaphysics, I couldn't really tell. What I do know is that we have had strong influences from the discourse of individuality, pushing the way we govern and inhabit our world today, citing white cis-men in how we need to act for what is best for the world, from our point of view.

> Cogito, ergo sum. I think, therefore I am.

A maxim that in many ways led the understanding of our existence for centuries.
I could bring up more fitting aphorisms, for instance:

> Man tends to define in terms of the familiar. But the fundamental truths may not be familiar.

But whomever and whatever I would cite would be lacking in one way or another. It is the sum of all that is important, even though it seems like we still need to study the individual parts in order to fully understand the whole.

The topics covered in this thesis have been many; AI, death, agency, colonialism, ethics, nuclear bombs. My main issue throughout this work was trying to limit the number of angles I took on. Agential realism has the ability to do that to you, suddenly you start seeing relations everywhere, meaningful symbols together with not so meaningful symbols, trying to sort out what can be used in a significant way. Everything becomes we.

But this is sort of the point; everything I do and everyone I meet are one and the same. There is no particular kind of ethics being discussed, no singular idea that can be taken to its fullest on its own. It seems like agential realism tells us that individual arguments become more or less meaningless, even more so in a metaphysical aspect? According to Barad it is the context and relations that make ideas meaningful, and even valid. It tells us that our knowledge is our existence, and our existence is our knowledge. Tied together from the start. What we know is who we are.

Are we then also responsible for all our actions and the actions of others? An idea that can fill one with dread at first, but you should quickly come to realise that we can only do so much. My apparatus has its limits in its exclusions, as does everyone else's. Even if you are responsible, your actions are limited. Try to re/act responsibly in the situations you meet in

your daily life, regarding the apparatuses you mark and the ones that mark you. The ability to re/act reasonably is a part of us and the greater phenomena. We have the ability to re/act with reason; we are part of the phenomena so the phenomena must be able to be reasonable; therefore we can be reasonable creations of the phenomena. Regarding ourselves as something else, something apart from the phenomena, hinders us to see what is truly reasonable.

At the same time I think it is important to remember that as with everything else, reason is ever changing and fluctuating. We cannot in a performative world tie ethics down to a few basic concepts that are supposed to be true. It is in the moment we can take a reasonable decision, trying to embrace and understand the intricate apparatuses that are leaving marks on us, and the ones we mark. Overreaching to those who we do not mark or are marked by can blind us to what is reasonable, making decisions not based on relations but on an idea for a general, non-existing, truth.

An essential outcome from agential realism I think we need to remember is that we are not invading the rest of the world from the outside, as the narrative usually goes. We are still very much part of the active world-building-apparatus. The responsibilities do not come about because we have to 'save' the earth from our 'evil' actions, as the Europeans tried to 'save' the original inhabitants of their colonies. We are part of the ongoing circle of taking and giving, intra-acting within the phenomena that is our world. Human curiosity and ingenuity is a part of the greater world apparatus. And this is where I believe our obligation comes into place, as we are entirely supported in our inquisitive endeavours by the world, receiving and using the energy made available for us, and must therefore also give back in the same manner for the possible continuation of the relation. The success of splitting the atom, curing disease or constructing the theory of relativity can be seen as a success for the whole of the planet apparatus that is earth, despite the extreme cost of energy the undertakings demanded. We are a resource of the planet in the same matter as oil or wind. Isn't then the mistreatment of the planet apparatus also a mistreatment of ourselves? Despite the comfortable benefits we think we get from it at first. Initial instincts in ethical matters might not always be the 'best' for the world apparatus as a whole, as our individual drive to secure what we see as our tribes, our lifestyle and our future often comes first in today's social discourse. As the wisdom that is Bhagavad Gita tells us, giving an idea of happiness:

> What seems at first a cup of sorrow is found in the end immortal wine … But the pleasure which comes from the craving of the senses with the objects of their desire, which seems at first a drink of sweetness but is found in the end a cup of poison. (Bhagavad Gita, 1962)

Life is the miracle, with no need for an afterlife. The immortal nectar is waiting for us right here and now, it just might taste bitter at first. Maybe to help us see the con/sequences of our re/actions?

References

Andersson, I. (2016). *What's the matter with discourse? An alternative reading of Karen Barad's philosophy.* Stockholm University Department of Education.

Austin, J. L. (1975). *How to do things with words.* Oxford University Press.

Awad, E., Dsouza, S., & Kim, R. (2018). The Moral Machine experiment. *Nature 563, 59–64*. https://doi.org/10.1038/s41586-018-0637-6

Ball, P. (2008). Water — an enduring mystery. *Nature, 452*, 291-292. https://doi.org/10.1038/452291a

Barad, K. (2007). *Meeting the universe halfway: Quantum Physics and the Entanglement of Matter and Meaning.* Duke University Press.

Barad, K. (2011). Nature's queer performativity. *Qui Parle, 19*(2), 121-158.

Barad, K. (2012). On Touching—the Inhuman That Therefore I Am. *differences 23 (3)*, 206–223. https://doi.org/10.1215/10407391-1892943

Barad, K. (2019). After the End of the World: Entangled Nuclear Colonialisms, Matters of Force, and the Material Force of Justice. *Theory & Event, Volume 22, Number 3*, 524-550.

Bhagavad Gita. (1962). (J. Mascaro, Trans.)

Braunmühl, C. (2018). Beyond hierarchical oppositions: A feminist critique of Karen Barad's agential realism. *Feminist Theory 19 (2)*, 223-240. doi:10.1177/1464700117741243

Buranyi, S. (2017). Rise of the racist robots – how AI is learning all our worst impulses. *The Guardian*. Retrieved 2021, from https://www.theguardian.com/inequality/2017/aug/08/rise-of-the-racist-robots-how-ai-is-learning-all-our-worst-impulses

Butler, J. (1990). *Gender Trouble: Feminism and the Subversion of Identity.* Routledge.

Choy, A. (2021). *Youtube*. Retrieved May 2021, from https://youtu.be/56zknDOEgPo

Díaz, M. G. (2020). Refrescos en México: Chiapas, el estado de México donde el consumo de refrescos es 30 veces superior al promedio mundial. (M. N. Daily, Trans.) *BBC Mundo*. Retrieved from https://mexiconewsdaily.com/news/with-average-daily-consumption-of-2-2-liters-of-coca-cola-chiapas-leads-the-world/

Diedrich, L. (2001). Breaking Down: A Phenomenology of Disability. *Literature and Medicine 20 (2)*, 209-230.

Edunov, S., Bhagat, S., Burke, M., Diuk, C., & Filiz, I. O. (2016). *Facebook Research*. Retrieved May 2021, from https://research.fb.com/three-and-a-half-degrees-of-separation/

Gabbatiss, J. (2017). There are over 100 definitions for 'life' and all are wrong. *BBC Earth*. Retrieved from http://www.bbc.com/earth/story/20170101-there-are-over-100-definitions-for-life-and-all-are-wrong

Gamble, C. N., Hanan, J. S., & Nail, T. (2019). What is new materialism? *Angelaki, 24:6*, 111-134. doi:10.1080/0969725X.2019.1684704

Hinton, P. (2017). A Sociality of Death. In (p. 223). In *What if Culture was Nature all Along?* (p. 223). Edinburgh University Press.

Hollin, G., Forsyth, I., Giraud, E., & Potts, T. (2017). (Dis)entangling Barad: Materialisms and ethics. *Social Studies of Science, 47(6)*, 918–941.

Ivarsson, J. (2016). Agentisk realism. En genusvetenskaplig formulering av kvantfysikens lagar. *Tidskrift för genusvetenskap 37(3)*.

Malm, A. (2018). On what matter does: Against New Materialism. In *The progress of this storm - nature and society in a warming world* (pp. 78-118). Verso.

Mullaney, T. (2019). *YouTube*. Retrieved May 2021, from https://youtu.be/KSEoHLnIXYk

Sigurðsson, G. (2020). Confucian philosophy as a universal approach to integrated living: A contemporary interpretation. In *Differences in identity in philosophy and religion* (pp. 21-40). Bloomsbury Academic.

Singer, P. (1995). *Rethinking Life & Death - the Collapse of Our Traditional Ethics.* Oxford University Press.

Sokol, J. (2019). *Quanta Magazine*. Retrieved 05 2021, from https://www.quantamagazine.org/black-hot-superionic-ice-may-be-natures-most-common-form-of-water-20190508/

Thornton, A. (2019). *World Economic Forum*. Retrieved May 2021, from https://www.weforum.org/agenda/2019/02/chart-of-the-day-this-is-how-many-animals-we-eat-each-year /

University of Utah. (2011). *Supercool: Water doesn't have to freeze until -48 C (-55 F).* Retrieved May 2021, from www.sciencedaily.com/releases/2011/11/111123133123.htm

Appendix A: The science behind it all

Charismatic physicist David Tong gives a short explanation on Quantum Field Theory (QFT), the academic field that Karen Barad has their PhD in, and that most of the agential theory is based on:

https://youtu.be/zNVQfWC_evg

The start of all thing's quantum came mostly from the double slit experiment, an experiment first come to life in the year 1801. Many videos delve into this concept, but I always enjoy watching Jim Al-Khalili explaining things (part of a longer, interesting talk):

https://youtu.be/A9tKncAdlHQ

One of many important ideas of all this that I haven't mentioned in the thesis is emergence. This is a concept equally valid in philosophy, social- and empirical (natural) sciences. **Kurzgesagt** does as always a great job explaining the fundamentals:

https://youtu.be/16W7c0mb-rE

Minute physics is a fun and often easy-going channel that explain basic physics concepts with nice animations, one of the first successful channels on YouTube that popularised physics. Here they give an amazing introduction to the theory of relativity, with an added bonus of a unique, home-made machine for greater understanding:

https://www.youtube.com/playlist?list=PLoaVOjvkzQtyjhV55wZcdicAz5KexgKvm

A real-life observation of the famous Bell's Theorem, a key element of quantum physics. This video also explains facts both about light waves and entanglement. The first link is from the physics aspect and the second is from the mathematical side of it all, giving a deeper understanding of both classical and quantum wave mechanics:

https://youtu.be/zcqZHYo7ONs

https://youtu.be/MzRCDLre1b4

For a greater understanding of the math involved in all of this, the channel in the last link is home to the excellent **3Blue1Brown**, where you can spend weeks watching amazingly animated math examples, giving rise to a whole new understanding of maths both for beginners and experts alike. I really recommend the two series on linear algebra and calculus to learn more on the two main branches of mathematics:

https://www.youtube.com/playlist?list=PLZHQObOWTQDPD3MizzM2xVFitgF8hE_ab

https://www.youtube.com/playlist?list=PLZHQObOWTQDMsr9K-rj53DwVRMYO3t5Yr

For a quick refresher of some basic maths, with also a whole new understanding of the concept of imaginary numbers (that actually are very real indeed), **Welch Labs** has one of YouTube's greatest mathematical series:

https://www.youtube.com/playlist?list=PLiaHhY2iBX9g6KIvZ_703G3KJXapKkNaF

For those who want to dive even deeper into a wide variety of physics concepts, I recommend the long living channel **PBS Space Time** that have had time to cover enough subjects to last several semesters. Here is one video on what the maximum 'speed' of light actually is about, an issue I briefly mentioned in the thesis:

https://youtu.be/msVuCEs8Ydo